S.C.

Notice of Allowability	Application No.	Applicant(s)	
	10/089,008	HAN ET AL.	
	Examiner	Art Unit	
	Anita K Alanko	1765	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address--

All claims being allowable, PROSECUTION ON THE MERITS IS (OR REMAINS) CLOSED in this application. If not included herewith (or previously mailed), a Notice of Allowance (PTOL-85) or other appropriate communication will be mailed in due course. **THIS NOTICE OF ALLOWABILITY IS NOT A GRANT OF PATENT RIGHTS.** This application is subject to withdrawal from issue at the initiative of the Office or upon petition by the applicant. See 37 CFR 1.313 and MPEP 1308.

1. ☒ This communication is responsive to *10/20/04 interview summary and 8/12/04 amdt*.

2. ☒ The allowed claim(s) is/are *1,3-5 and 7-21*.

3. ☒ The drawings filed on *21 March 2002* are accepted by the Examiner.

4. ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
   a) ☐ All b) ☐ Some* c) ☐ None of the:
      1. ☐ Certified copies of the priority documents have been received.
      2. ☐ Certified copies of the priority documents have been received in Application No. _____ .
      3. ☐ Copies of the certified copies of the priority documents have been received in this national stage application from the International Bureau (PCT Rule 17.2(a)).

   * Certified copies not received: _____.

Applicant has THREE MONTHS FROM THE "MAILING DATE" of this communication to file a reply complying with the requirements noted below. Failure to timely comply will result in ABANDONMENT of this application.
THIS THREE-MONTH PERIOD IS NOT EXTENDABLE.

5. ☐ A SUBSTITUTE OATH OR DECLARATION must be submitted. Note the attached EXAMINER'S AMENDMENT or NOTICE OF INFORMAL PATENT APPLICATION (PTO-152) which gives reason(s) why the oath or declaration is deficient.

6. ☐ CORRECTED DRAWINGS (as "replacement sheets") must be submitted.
   (a) ☐ including changes required by the Notice of Draftsperson's Patent Drawing Review (PTO-948) attached
      1) ☐ hereto or 2) ☐ to Paper No./Mail Date _____.
   (b) ☐ including changes required by the attached Examiner's Amendment / Comment or in the Office action of Paper No./Mail Date _____.

   Identifying indicia such as the application number (see 37 CFR 1.84(c)) should be written on the drawings in the front (not the back) of each sheet. Replacement sheet(s) should be labeled as such in the header according to 37 CFR 1.121(d).

7. ☐ DEPOSIT OF and/or INFORMATION about the deposit of BIOLOGICAL MATERIAL must be submitted. Note the attached Examiner's comment regarding REQUIREMENT FOR THE DEPOSIT OF BIOLOGICAL MATERIAL.

Attachment(s)

1. ☐ Notice of References Cited (PTO-892)
2. ☐ Notice of Draftperson's Patent Drawing Review (PTO-948)
3. ☐ Information Disclosure Statements (PTO-1449 or PTO/SB/08), Paper No./Mail Date _____
4. ☐ Examiner's Comment Regarding Requirement for Deposit of Biological Material
5. ☐ Notice of Informal Patent Application (PTO-152)
6. ☒ Interview Summary (PTO-413), Paper No./Mail Date *1004* .
7. ☒ Examiner's Amendment/Comment
8. ☐ Examiner's Statement of Reasons for Allowance
9. ☐ Other _____.

EXAMINER'S AMENDMENT

An examiner's amendment to the record appears below. Should the changes and/or additions be unacceptable to applicant, an amendment may be filed as provided by 37 CFR 1.312. To ensure consideration of such an amendment, it MUST be submitted no later than the payment of the issue fee.

Authorization for this examiner's amendment was given in a telephone interview with Mark Homer on October 20, 2004.

The additional amendment to the claims (in addition to the changes proposed in the amendment filed on 8/12/04) is to provide for proper antecedent basis for all the terms in the claims and to correct minor typographical errors.

The application has been amended as follows:

In the specification:

On page 3, lines 20, 22, 25 and 27, delete "photo"

In the claims:

1. (Currently Amended) A method of fabricating a parylene diaphragm acoustic transducer comprising:

depositing backside and topside silicon nitride on a deposition surface of a silicon substrate, followed by depositing layers of first *Al,* insulating parylene and second *Al* on the topside silicon nitride layer;

depositing a second thicker parylene layer as a diaphragm;

patterning contact holes to the bottom and top *Al* layers;

releasing the diaphragm by patterning the backside silicon nitride; ~~and~~

removing portions the silicon substrate by etching to release the diphragm; and thereafter, patterning the silicon nitride top side layer.

2. (Canceled).

3. (Currently Amended) A method of fabricating a parylene diaphragm acoustic transducer comprising:

depositing silicon nitride on a silicon substrate, followed by depositing a first conductive layer, ~~and~~ an insulating layer, and a second conductive layer;

depositing a zinc oxide layer adjacent the insulating layer;

depositing a parylene layer in a form to serve as a diaphragm;

patterning contact holes to the top and bottom conductive layers; ~~and~~

releasing the diaphragm by removing the underlying silicon substrate; and,

patterning the silicon nitride underlying the parylene diaphragm layer to provide further support for the parylene diaphragm layer.

4. (Original) A method as claimed in claim 3 wherein the insulating layer is layer of parylene which is relatively thinner than the diaphragm parylene layer.

5. (Currently Amended) A method as claimed in claim 4 wherein the zinc oxide ZnO layer is deposited over the first conductive layer ~~and underneath is deposited~~ after the first conductive layer is deposited and prior to the deposition of the insulating parylene layer.

6. (Canceled).

7. (Original) A method as claimed in claim 4 wherein the silicon nitride is patterned to form cantilever type transducer elements supported on a bottom surface of the parylene, and wherein the zinc oxide and electrodes are patterned to only extend along an edge of each of the cantilever style transducers.

8. (Original) A method as claimed in claim 7 wherein each of the silicon nitride transducer elements is in a generally trapezoidal shape and arrayed about a center region of the parylene diaphragm layer.

9. (Original) A method as claimed in claim 4 wherein the silicon nitride layer underlying the parylene diaphragm layer is patterned to form a single cantilever type transducer including a narrow region of zinc oxide and electrode contacts extending along the side of the transducer supported from the silicon substrate.

10. (Original) A method as claimed in claim 9 wherein the cantilever type silicon nitride transducer is generally rectangular in shape.

11. (Currently Amended) A method as claimed in claim 9 wherein the transducer is a single transducer formed of [[a]] the layer of silicon nitride in a generally trapezoidal shape with the single zinc oxide layer extending along the edge of the transducer supported directly from the silicon substrate.

12. (Previously Presented) A parylene diaphragm acoustic transducer comprising a silicon substrate supporting first and second conducting layers, separated by an insulating layer, and having a layer of zinc oxide ZnO in between the first and second conducting layers, and a layer of parylene serving as a diaphragm layer formed over the first and second conductive layers and formed at least in part over the zinc oxide layer.

13. (Currently Amended) A parylene diaphragm transducer as claimed in claim 12 wherein the insulating layer between the conducting layers is a thin layer of parylene and the parylene layer serving as a diaphragm is relatively thicker in extent than the parylene insulating layer.

14. (Currently Amended) A parylene diaphragm acoustic transducer as claimed in claim 12 including a silicon nitride layer underlying the parylene diaphragm layer in part, the silicon nitride layer defining in cooperation with the zinc oxide layer an acoustic transducer supported from the parylene layer.

15. (Original) An acoustic transducer as claimed in claim 14 wherein the silicon nitride layer is patterned to form one or more trapezoid shaped cantilever type acoustic transducers underlying the parylene layer and having the zinc oxide layer extending only along an edge of the silicon nitride layer that is directly supported from the underlying silicon substrate.

16. (Currently Amended) A parylene diaphragm acoustic transducer as claimed in claim 14 wherein a center region of the parylene diaphragm layer is occupied by a silicon nitride layer separate from the cantilever type silicon nitride transducer layers, and further having [[a]] the zinc oxide layer at least partially overlying the silicon nitride layer and separately connected to electrode lines running to separate electrode terminals from the electrode terminals connected to the edged of the cantilever type acoustic transducers.

17. (Original) A parylene diaphragm acoustic transducer as defined in claim 16 further including a center region of the parylene diaphragm left blank by the cantilever type silicon

nitride acoustic transducers, and having thereon a layer of aluminum to emphasize the movement of the parylene diaphragm.

18. (Original) A parylene diaphragm acoustic transducer as claimed in claim 14 further including a silicon nitride layer underlying the parylene diaphragm and defining a single cantilever type acoustic transducer underlying a portion of the parylene diaphragm layer, and further including the region of zinc oxide extending only along an edge of the cantilever type acoustic transducer supported from the underlying silicon substrate.

19. (Currently Amended) A parylene diaphragm acoustic transducer as claimed in claim 18 wherein the ~~silicone~~ silicon nitride layer is generally rectangular in shape.

20. (Original) A parylene diaphragm acoustic transducer as claimed in claim 18 wherein the silicon nitride layer is generally trapezoidal in shape.

21. (Original) A parylene diaphragm acoustic transducer as claimed in claim 19 wherein the zinc oxide region extends along an edge of the acoustic transducer supported from the silicon substrate, and wherein both the zinc oxide layer and the silicon nitride layer defining the acoustic transducer are periodically interrupted extending therethrough to the parylene diaphragm layer so that the signal energy of the acoustic transducer is focused to an electrode layer connected to the supported edge thereof.

Replace the abstract with the following abstract:

Abstract of the Disclosure

A micromachined acoustic transducer comprising a parylene diaphragm piezoelectric transducer. The parylene diaphragm has far lower stiffness than the silicon nitride. The method for fabricating the parylene diaphragm acoustic transducer utilizes a prestructured disphragm layer utilizing silicon nitride which is compatible with high temperature semiconductor process. A silicon nitride layer is patterned and partially removed after forming the parylene diaphragm layer in order to enhance the structural qualities of the parylene diaphragm. The diaphragm may be flat or dome-shaped.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Anita K Alanko whose telephone number is 571-272-1458. The examiner can normally be reached on Mon-Fri until 2:30 pm (Wed until 11:30).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nadine Norton can be reached on 571-272-1465. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Anita K. Alanko
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